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Using Blogs to Improve Elementary School Students' Environmental Literacy in Science Class

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Abstract: The purpose of this study is to examine the effects of blog activities on elementary students' environmental literacy in science class. The relationships between students' environmental literacy levels, their parents' interest in environmental activities and the frequency of outdoor activities they do have also been examined. Pre-test post-test quasi-experimental design has been utilized. The participants of the study are 80 seventh-grade elementary school students. The data have been gathered through "Environmental Literacy Scale". After that, the instructor has created a blog to share some movies, animations and reflective questions for all the students. The students could follow and engage in all the sharing. The activities have lasted for eight weeks. Descriptive statistics, t-test and regression analysis have been tested via the data. The results have indicated that there is a significant difference between pre and post test scores regarding the students' "environmental knowledge", "attitude towards environment" and "being responsible for environment". Furthermore; positive but weak relationship has been detected between students' environmental literacy levels and parents' interests in environmental activities. On the other hand, there is a moderate, positive correlation between students' interest in environmental problems and involving in outdoor activities with parents ($r=0.423$, $p=0.001$). Overall, students' involvements in blog activities and doing outdoor activities with parents have been found to be effective in acquiring environmental literacy.

Keywords: *Blogs, social media, environmental literacy, elementary school students, science class.*

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Introduction

Literacy may be defined as an ability to write and read with written or pressed symbols and use this for communication (Daudi& Heimlich, 1997). On a different definition, literacy is the use of reading and writing skills to give a better meaning to the world (Clair, 2003). In the course of time, the definition of the literacy has expanded. Literacy has started to be defined as having enough information and equipment in the field. In this context; computer literacy, media literacy, mathematics literacy and environmental literacy may be counted as examples. Environmental literacy has been introduced into literature by Charles E. Roth for the first time. According to Roth, environmental literacy is defined as information about the environment and awareness level of it (Wright, 2006). Nowadays, there are many definitions of environmental literacy. In general, definition of environmental literacy is to understand individuals and societies and their relationship in their natural environment. Individuals who are environmentally literate are aware of all the activities that originate from humanity and their damage to the environment and; they can decide in a correct way about the future of environmental life (Orr, 1990). In 1992, Charles E. Roth proposed an expanded definition of environmental literacy. He thinks that environmental literacy also includes noticeable behaviors. Environmental literacy is the level that individuals can turn their information and sensitiveness into behavior (Roth, 1992). In other words, environmental literacy means that people have appropriate knowledge to make the environment systems work without problems and take the necessary precautions and do what is necessary to ensure natural systems to achieve overall aim (Disigner & Roth, 1992). National Environmental Education Advisory Council (NEEAC) has also made a definition for environmental literacy. According to this definition, environmental literacy is to take the right decisions about environmental issues and turn the conditions to positive behavior for the environment. NEEAC has also stated that environmental literacy helps individuals take reasonable decisions about environmental subjects and increases their sustainable life standards by doing so (NEEA, 1996). Undoubtedly, environmental information must be the basic principle of environmental literacy. In this context, environmental literacy is individuals' gaining fundamental information and abilities regarding the environment (Moseley, 2000).

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Environmental literacy does not solely mean equipping an individual with ecologic information. Aside from obtaining information about environment, environmental literacy means observing the individual practicing these information and abilities in their behaviors (Morrone and others, 2001). When we consider the situation from this point of view, environmental literacy is to mix information, concepts and principles that are obtained by scientific studies and research with appropriate behavior for the environment (Hernandez, 2005). While we can encounter many definitions about environmental literacy, it is also possible to have multiple views and opinions about the qualities that must exist within an individual who is literate in environment.

When we focus on the first definition given by Roth (1968), we realize that these are the qualities that an environmentally literate individual should have are:

- One should understand the relationship between natural and social systems
- One should apprehend that humans are also part of the nature.
- One should be able to see the harms of technology advances to the environment.
- One should also be aware of the fact that this process of learning about environment is a process that lasts forever.

Environmentally literate people should have a wide variety of knowledge about environment. Furthermore, they should also be individuals who can show faith, have an idea, display a certain behavior and hold a constructive attitude while determining environmental problems and taking precautions for them.

In order for the individuals to become environmentally literate, information related to environment should be presented as a positive behavior. Along with this, one should also have a strong and fundamental scientific infrastructure about the subject with individual environmental attitude, ability and values (Morrone and others, 2001).

Besides, while giving environmental literacy education to individuals, various studies have been made to understand which points should be given priority. North American Association Environmental Education aims to make a proper guidebook for an effective environmental education in its studies. The sub-factors of twenty-six education models that have been designed until that day have been examined by Simmons (1995) in details and as a result of these examinations; seven main causes were determined (Transferred by Weiser from 1995, 2001). These are: Susceptibility, Knowledge of Ecology, Socio-political Knowledge, Environmental Problem Consciousness, Talents, Environmental Acts and Causes that determine Environmental Activities. Roth (1992) has determined four factors for the environmental literacy. These are; information, attitude, value and ability. These factors determined by Roth (1992) are accepted by many other researchers.

Through the developed educational technologies, teaching these information and abilities do not require in-class activities. Web 2.0 technologies that give priority to share knowledge by using the opportunities that arise with daily technologies such as Internet, multimedia and mobile technologies present important learning opportunities. Blogs, wikis and social networks are also amongst Web 2.0 technologies (Kaplan & Haenline, 2010; Gruzd, Staves, & Wilk, 2011; Ravenscroft, Warburton, Hatzipanagos & Conole, 2012). These tools are able to create information pools with different purposes. Blogs that can also be named as "Online Personal Journals" gives the ability to publish for all computer users who have no knowledge of designing websites using the Internet (DeAndrea et.al, 2012). While blogs have not come out for education purposes at first, they are often used to support face to face classes and online education (Minocha & Kerawalla, 2011). Using blogs for educational purposes makes them a publishing sharing channel for not only as a personal publishing tool but also a publishing tool for a specific community (Blau, Mor, & Neuthal, 2009). Aside from publishing, blogs also serve as a mutual publishing and communicational tool for users (Dabbagh & Kitsantas, 2012). Via blogs, students have the chance to publish what they write, evaluate someone else's work, create discussion groups and develop mutual projects (Churchill, 2009). Furthermore, using blogs in educational areas also contributes to make connections among students between social support and self-expression subjects (Deng & Yuen, 2011). When we take the issue into the consideration from this perspective, examining the effects of using blogs and these new digital acculturation tools holds a great importance with respect to environmental literacy.

The Purpose of the Study

The purpose of this study is to examine the effects of blog activities on elementary students' environmental literacy. The blog is used to improve students' environmental literacy. In this regard, the environmental literacy level was examined with four subscales which are information, attitude, usage and interest. Furthermore, relationships among student's environmental literacy level, their parents' interest in environment and being involved in outdoor activities are also examined. The research questions are as follows;

1. Is there a significant difference between pre-test and post-test scores of students who have used blog activities?

2. Is there a significant relationship between students' environmental literacy levels and their parents' interest in environmental activities?
3. Is there a significant relationship between student's environmental literacy levels and the frequency of being involved in outdoor activities with their parents?

Method

In the study pre-testpost-test quasi-experimental design has been utilized. Quasi-experimental design enables to observe the effects of experiments regarding various variables (Cepni, 2012). In this study, the effect of blog activities on student's environmental literacy levels have been tested with respect to their parents' frequency of doing outdoor activities and parents' interest in environment.

Samples

The participants of the study were 80 seventh-grade students. They were studying in a public elementary school in 2015-2016. 42 (52,5%) students were male and 38 (47,5%) were female.

Settings

The study has been conducted with elementary school students in a public school in Turkey. One of the researchers is also the science teacher of the school. He has led the environmental literacy activities on blog. These blog activities have lasted for eight weeks. The instructor has the role of a facilitator during the study. Initially, a pre-test has been applied and students have been informed about the blog they will use. The instructor has created a blog and broadcast some movies and animations on environmental issues and written some reflection questions related with them (see Figure 2.1). In total, eleven multimedia documents have been published on the blog. The students have followed the blog. They have been free to write their own comments. Moreover; a reflective question has been posed each week on the blog for students to reflect their perspectives. At the end of the eight-week; post-test has been utilized.



Figure 1. A view from the blog page.

Data Collection

Environmental Literacy Scale (ELS) has been used to collect the data. At the beginning of the study, ELS and seven descriptive questions have been asked in order to gain insights regarding students' demographics and their environmental literacy skills. After eight-week-experiment, ELS has been reutilized again as a post-test.

Instruments

Environmental Literacy Scale (ELS) has been originally developed by Michigan State University (MSU-WATER, 2001-2006). ELS measures student's environmental literacy level in accordance with the four factors which are information,

attitude, usage and interest. The first part of the scale, there are eleven questions regarding daily environmental subjects, and they have been asked to students with multiple answer choices. Every question has five answers with the option of "I do not know." The attitude dimension of the ELS requires students to fill nine entries in a Likert type scale to measure their environmental attitude. The other dimension is usage and it has nineteen questions with Likert type scale. This dimension measures students' inclination to act environmentally responsible. Student's interest is also measured with nine entries that show their inclination to earn new knowledge regarding environmental issues.

The scale has been translated into Turkish by Teksoz, Sahin, & Ertepinar (2010). ELS's validity has been approved by three environmental education expert's examination. It has also been reviewed by two language experts. ELS consisting of four pillars which are information, attitude, usage and interest proves that it is adaptive in terms of factor analysis with values obtained by 0,88 KMO value. Through Bartlett Test, the result has been found to be 17848.672 ($p < 0.000$) and this result proves data come from fitting main mass with multiple variables distribution. Considering the results obtained by factor analysis, ELS is observed to be grouped into four dimensions as in the original. In the first category, the grouped factor weights between 0.691 and 0.418 values and those that vary in between are in the dimension of "usage". For instance, in the dimension of interest, factor weights vary between 0.678 and 0.481. Third category that varies between 0.684 and 0.316 in sense of factor weights shows the dimension of "knowledge". In the fourth category, dimension of attitude varies between 0.584 and 0.391. Knowledge, attitude, usage and interest dimensions Cronbach Alpha internal consistency coefficients are in order; 0.88, 0.70, 0.81, 0.88 and are found to be acceptable. Via defining questions, the students have been also asked how often they go out for outdoor activities with their families and what their family's interests are in relation to the environment.

Analysis of Data

The data have been analysed using SPSS 20.0 for descriptive statistics, t-test and regression analysis. The analysis has been performed to discover whether there is a significant difference between students' pre and post-test environmental literacy level. Furthermore, regression analysis has been conducted to investigate the relation between students' environmental literacy, parents' interest in environment and the frequency of doing outdoor activities together.

Results

Is there a significant difference between pre-test and post-test scores of students who used blog activities?

In order to investigate whether there is a significant difference between students' pre-test and post-test environmental literacy scores; four subscales of environmental literacy have been examined. These subscales are environmental knowledge, attitude towards environment, usage of environment and interest in environmental issues.

The repeated measure t-test has been performed to investigate if there is a significant difference between students' pre-test and post-test environmental knowledge subscale scores. Table 1 illustrates students' environmental knowledge scores.

Table 1: "Environmental knowledge" t-test result

Points	Groups	N	\bar{X}	SS	$Sh_{\bar{x}}$	t-test		
						t	Sd	p
Environmental Knowledge	Pre-test	56	4,82	1,69	0,23	-2,90	55	0,005
	Post-test	56	5,32	1,95	0,26			

The results have shown that there is a statistically significant difference between pre-test ($m=4.82$, $sd=1.69$) and post-test ($m=5.32$, $sd=1.95$) scores in terms of the environmental knowledge of participants ($t(55)=-2.90$, $p=0.005$).

The repeated measure t-test analysis has also been conducted to determine whether there are significant differences in the students' pre and post test scores of attitude towards environment which is another factor of environmental literacy. The results are presented in Table 2. According to the Table 2, there is a essential difference between students' pre-test ($m=34.88$, $sd=4.98$) and post-test ($m=36.43$, $sd=4.68$) attitudes scores ($t(55)=-2.13$, $p=0.037$).

Table 2: Attitude towards the Environment t-test result

Points	Groups	N	\bar{X}	SS	$Sh_{\bar{x}}$	t-test		
						t	Sd	p
Attitude Towards the Environment	Pre-test	56	34,88	4,98	0,67	-2,13	55	0,037
	Post-test	56	36,43	4,68	0,63			

Similarly, the factor of environmental literacy is the use of environment. It has been realized that there is a crucial difference between the students' pre-test ($m=66,57, sd=9,39$) and post-test ($m=70,73; sd=8,81$) use of environment scores ($t(55)=-3,36, p=0.001$).

Table 3: Usage of Environment-test result

Points	Groups	N	\bar{X}	SS	$Sh_{\bar{x}}$	t-test		
						t	Sd	p
Usage of Environment	Pre-test	56	66,57	9,39	1,25	-3,36	55	0,001
	Post-test	56	70,73	8,81	1,18			

Finally, the students' interests in environmental problems subscale scores have been investigated. The results of pre-test and post-test scores are illustrated in Table-4.

Table 4: The interest in Environmental Problems t-test result

Points	Groups	N	\bar{X}	SS	$Sh_{\bar{x}}$	t-test		
						t	Sd	p
Interest on Environmental Problems	Pre-test	56	36,52	6,41	0,86	3,66	55	0,001
	Post-test	56	33,93	5,30	0,71			

Statistically, a notable difference has been found between the students' pre-test ($m=36,52; sd=6,41$) and post-test ($m=33,93, sd=5,30$) interest in environmental problems scores ($t(55)=3,66; p=0.001$).

Do the students' environmental literacy levels relate to their being involved in outdoor activities with their parents?

In order to examine the relationship between the students' environmental literacy and their parents' interests in environment; regression analysis has been tested. The relationships between parents' interests in environment and three subscales of environmental literacy have been investigated. These subscales are the attitude towards environment, the usage of environment and the interest in environmental problems.

The results indicates that there is a positive but weak relationship between the students' attitude towards environment and parents' interests in environment ($r=0.100, p=0.463$). The results are given in Table 5.

Table 5. The relationship between Attitude towards Environment and parents' interest in environment.

		Parents' interest in	Attitude towards
Parents' interest in	Pearson Correlation	1	0,1
	Sig. (2-tailed)		0,463
	N	56	56
Attitude towards	Pearson Correlation	0,1	1
	Sig. (2-tailed)	0,463	
	N	56	56

Similarly, there is a positive but weak relationship between the usage of environment subscale and the parent's interests in environment ($r=0.025; p=0.856$). The results are illustrated in Table 6.

Table 6: The relationships between the usage of environment and the parent's interest in environment

		Family's Interest to	Usage of Environment
Family's Interest to Environment	Pearson Correlation	1	0,025
	Sig. (2-tailed)		0,856
	N	56	56
Usage of Environment	Pearson Correlation	0,025	1
	Sig. (2-tailed)	0,856	
	N	56	56

The third subscale of the environmental literacy that has explored the relationships between parents' interest in environment and interest in environmental problems. The analysis has shown that there is a positive but weak relationship ($r=0.085$, $p=0.533$) between them. The results are presented on Table 7.

Table 7: The relationships between interest in environmental problems and parent's interest in environment.

		Family's Interest to	Interest to Environmental
Family's Interest to Environment	Pearson Correlation	1	0,085
	Sig. (2-tailed)		0,533
	N	56	56
Interest to Environmental problems	Pearson Correlation	0,085	1
	Sig. (2-tailed)	0,533	
	N	56	56

Do the student's environmental literacy levels relate to their being involved in outdoor activities with their parents?

Regression analyses have been performed to explore the relationships between student's environmental literacy and their being involved in outdoor activities with their parents. The relationship between their attendance in outdoor activities with their parents and three subscales of environmental literacy have been inquired. These subscales are the attitude towards environment, the usage of environment and their interest in environmental problems.

The results indicates that there is positive but weak relationships between the students' attitude towards environment and their participation in outdoor activities with parents ($r=0.259$, $p= 0.054$). The results are displayed on Table 8.

Table 8: The relationship between the attitude towards environment and their in outdoor activities

		Frequency of outdoor	Attitude towards
The frequency of outdoor activities	Pearson Correlation	1	0,259
	Sig. (2-tailed)		0,054
	N	56	56
The attitude towards environment	Pearson Correlation	0,259	1
	Sig. (2-tailed)	0,054	
	N	56	56

In a like manner, the results indicates that there is a positive but weak relationship between the usage of environment and the students' being involved in outdoor activities with parents ($r= 0.262$, $p=0.051$). The results are demonstrated on Table 9.

Table 9. The relationships between the usage of environment subscale and the students' integration into outdoor activities

		Frequency of outdoor	Usage of Environment
Frequency of outdoor Activities	Pearson Correlation	1	0,262
	Sig. (2-tailed)		0,051
	N	56	56
Usage of Environment	Pearson Correlation	0,262	1
	Sig. (2-tailed)	0,051	
	N	56	56

Ultimately, it has been explored whether there is a relationship between the students' interest in environmental problems and their being involved in outdoor activities with parents. The participants' interest in environmental problems and their participation in outdoor activities with parents have moderately substantial and positive relationship ($r=0.423$, $p=0.001$). The results are given in Table 10.

Table 10. The relationship between students' interest in environmental problems and their being involved in outdoor activities with parents

		Frequency of outdoor	Interest in Environmental
Frequency of outdoor Activities	Pearson Correlation	1	,423**
	Sig. (2-tailed)		0,001
	N	56	56
Interest in Environmental Problems	Pearson Correlation	,423**	1
	Sig. (2-tailed)	0,001	
	N	56	56

Discussion and Conclusion

The main purpose of this study is to examine the effects of blog activities on the elementary students' environmental literacy. In the study, environmental literacy is considered with four subscales which are "environmental knowledge", "attitude towards environment", "usage of environment" and "interest in environmental problems". The results demonstrate that using the blogs for environmental education significantly increases the students' environmental knowledge. Furthermore, the students' attitude towards the environment and their usage of environment are also significantly improved. This result indicates that students' attendance in the blog activities is effective in acquiring environmental literacy. It is also deduced, in the literature, environmental education increases the students' environmental knowledge and their environmental attitude levels. In his study, Hsu (2004) states that environmental courses can cause positive influences on individuals in concern with the environment. In another research, Poudel and others (2005) have found similar results. They give students various environmental educational activities to increase their motivation towards the environmental issues. In their research, Moody and others (2005) uses various educational activities to improve the university students' environmental literacy levels. These and many other studies in the literature show that the environmental education activities improve student's environmental literacy levels. A vital difference is found between pre and post test scores of the students regarding "environmental knowledge", "attitude towards environment" and "usage of environment".

On the other hand; the results indicate that while students' scores of environmental knowledge, attitude towards environment and usage of environment are significantly increased in post-test, their scores belonging to their interest in environmental problems subscale does not significantly change. It can be stated that the students need more education, mostly practical, to develop an interest in environmental problems. Kisoglu (2009) has conducted a mixed research study with sixty teacher candidates and he has found similar results. In this regard, further qualitative studies could be more purposeful to understand alteration of those subscales.

In present study, relationship between students' environmental literacy levels and their parents' interest in environment is also examined in three subscales of environmental literacy. The fourth subscale, environmental knowledge, is excluded from the regression analysis because the students' environmental knowledge scores are a part of academic achievement and could have an indirect relationship with their parents' interest in environment. The result of the regression analysis shows that the parents' interest in environmental problems has a positive but weak relationship with three subscales of environmental literacy which are the attitude towards environment, the usage of environment and the interest in environmental problems as expected by the researchers. In their study, Teksoz, Sahin and Ertepinar (2010) have found that the teacher candidates' environmental knowledge has a positive relationship with their attitude toward environment, the usage of environment and their interest in environmental problems. A similar result has been found in the study conducted by Dillon and Gayford (1997). Tikka, Kuitunen and Tynys (2000) have conducted a study in Finland. The result of the study points out that the students' environmental knowledge has a positive effect on their attitude towards environment. Another study conducted with 848 elementary students exhibits that there is a high-level relationship between the attitude towards environment and the usage of environment (Okesli, 2008). In this regard; another study has been conducted by Istanbulu (2008) with the elementary school students to explore the relationship between subscales of environmental knowledge. In this study; a low level relationship has been found between the environmental knowledge and the usage of environment. Moreover, the attitude towards environment has a high level significant relationship with the usage of environment.

In the current study; the relationship between students' environmental literacy levels and the frequency of their participation in outdoor activities with parents has also been examined. The results indicates that there is a positive but weak relationship between the students' integration into outdoor activities with their parents and two subscale of environmental literacy which are the usage of environment and the attitude towards environment. On the other hand; it is concluded that a moderately significant and positive relationship between students' interest in environmental problems and their attendance in outdoor activities with their parents.

This result depicts that environmental literacy could be improved by doing various outdoor activities. The students' interest in environment could be enhanced by doing such activities more often. In this regard, Ozdemir(2010) has conducted a study to perceive the effects of environmental courses based on outdoor activities on the students' environmental knowledge and attitudes. At the end of the study, aside from students consciousness about natural resources and harming them, a behavioural increase of students towards environmental problems that they face, their apprehension and how responsible they act is also observed.

In conclusion, the blogs which are used as a daily educational technology tool are concluded to be efficient enough to develop students especially in terms of knowledge, attitude and usage dimensions but not sufficient enough to make them more interested in environmental problems. Another study also shows that the increase in the students' interest in environmental problems is also closely related to the frequency of the students' participation in outdoor activities. It is likely that the student's susceptibility to environmental issues may only be increased by strengthening their link to nature. In this context, modern technological educational programs supported by outdoor activities can be practiced on students and results can be examined. These studies need to be conducted in different levels in educational hierarchy and it carries a great importance in order to have a balance point between outdoor activities and technological education.

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